SERVING THE PROFESSION OF ENGINEERING

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Midwest Engineer

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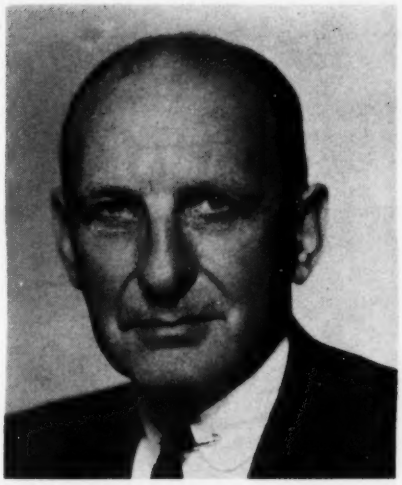
Photo—courtesy of Chicago Association of Commerce and Industry

Christmas on Michigan Avenue

Satellite Communications

. . . and what we may expect in future developments

Last October 25th James E. Dingman, Executive Vice President, American Telephone & Telegraph Co., addressed Western Society of Engineers, on "Satellite Communications." Excerpts from Mr. Dingman's highly informative report are presented here.



James E. Dingman

Some 446 WSE members and guests gathered at the Furniture Mart on October 25th to hear a talk by James E. Dingman on "Satellite Communications." Mr. Dingman is executive vice president of the American Telephone & Telegraph Co., New York.

In his highly informative talk he explained that "to the communications companies satellite communications means the establishment of microwave radio system over jumps of several thousand miles using satellite borne repeaters instead of conventional towers and ground repeaters now used in land systems."

Mr. Dingman pointed out that there were other types of satellite communications such as TV, signals from weather observation satellites and other information that might be gathered by satellites and transmitted to special receivers on the earth's surface. He also mentioned that it might be possible to use satellites some day as broadcast transmitters to home receivers, but stressed the fact that the commercial communications carriers' primary interest today is the practical use of the satellite as microwave repeaters to establish working microwave systems and get communications channels for use in their regular networks.

In emphasizing the importance of such developments, he explained that today our overseas communications are handled over a network of cables and radio facilities. However, usage of overseas telephone service is increasing about 20%, year over year. Preliminary studies indicate that microwave systems using satellites as repeaters have potential possibilities of giving less costly facilities than cables do.

Two Systems

Mr. Dingman pointed out that there are two systems of satellites that could be used. One would use satellites in orbit over the equator at an altitude of 22,300 miles. At this altitude the orbit time would be 24 hours, the same as the earth's and the satellite would seem to stand still in space. The other would use satellites at altitudes of six thousand to nine thousand miles. Each has advantages and disadvantages. Next, Mr. Dingman discussed the two main phases of satellite communications; first, the experimental, and second, the other concerning planning of a commercial usable system.

There are several experiments with active satellites planned for 1962. One is financed by A.T. & T. and called TELSTAR I. It is planned for an elliptical

(Continued on next page)

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Calendar of Chicago Engineering

—DEC. 13, WED., Noon Luncheon Meeting, 12:00 Noon. At WSE Hq.

—JAN. 3, WED., Noon Luncheon Meeting, 12:00 Noon. At WSE Hq.

—JAN. 10, WED., Noon Luncheon Meeting, 12:00 Noon. At WSE Hq.

—JAN. 17, WED., Noon Luncheon Meeting. At WSE Hq.

—JAN. 23, TUES., General Meeting and Dinner. Social Hour ((5:15-6:15 P.M.). Dinner (6:15). Technical Session (8:00 P.M.). At WSE Hq.

—JAN. 24, WED., No WSE Noon Luncheon Meeting. Reserved for ASME.

Satellite Communications . . . *continued from page 3*

orbit. In addition to the TELSTAR experiment, one sponsored by National Aeronautics and Space Administration will also take place in 1962. A third experiment, also under NASA direction, involves use of a high altitude satellite.

In the latter part of his talk, Mr. Dingman discussed at some length the question of the ownership and operation of the U. S. portion of the international satellite communications system and the recommendations of the AD Hoc Carrier Committee (a group composed of representatives of the U. S. international communication carriers working under the direction of the Federal Communication Commission) that a non-profit satellite corporation be created not dominated by any one U. S. carrier.

In his conclusion, Mr. Dingman referred to the sentiments and opinions of representative groups on the matter of government vs private ownership. In his final words he said, "We look upon satellite communications as a way of getting better and possibly cheaper telephone facilities to serve the major cities of the world.

"Equally important, we look upon it as an opportunity to improve communications of all types to and between all nations, large and small, with the hope and expectation that improved communications will bring about better understanding and advance the cause for lasting peace."

L to R: George S. Hall, Ill. Bell Tel. Co.; WSE president Philip L. Coleman, and James E. Dingman who spoke on "Satellite Communications."

L to R: William V. Kahler, president Ill. Bell Tel. Co.; O. G. Smith, chief engineer, Ill. Bell Tel. Co.; J. T. Rettaliata, president IIT.

Mr. Dingman became associated with the Bell System in 1922.

During the following years he held posts of ever increasing responsibilities. In 1952 he became Vice President and General Manager of Bell Telephone Laboratories and in 1956 Director of Operations, Long Lines. In 1959 he was named Vice President and Chief Engineer, American Telephone & Telegraph Co. In August 1961 he became executive vice president.

Vinyl Plastic Filter Aids Water Treatment

A license agreement to market water treatment equipment which employs a vinyl plastic filter has been signed between The Mead Corporation and B. F. Goodrich. BFG receives exclusives rights to manufacture and market the waste disposal apparatus, developed by Mead, which employs the Akron firm's Koroseal rigid vinyl plastic filtercomb.

A prototype trickling filter plant is now in operation at the Rome Kraft Company's Rome, Georgia, plant, one of the nation's largest pulp and paperboard mills. The new 100,000 cubic-foot plant is three stories high and contains 6,250 Koroseal rigid vinyl filtercomb-like units or packs manufactured by BFG's Industrial Products Company.

While the first vinyl-cored plant was designed specifically for treatment of pulp and paper waste, B. F. Goodrich says the same principle holds significant advantages for municipal sewage treatment, for independent sewage disposal units serving suburban housing developments and, in industry, for treating food processing plant wastes and for a wide variety of other industrial uses where bacteria oxidation is needed. Koroseal vinyl used in the system proved to be superior to other plastics in structural strength, ease of installation and resistance to chemicals.

The vinyl filtercomb units perform the same function as broken rock or tile in conventional stone trickling filter beds but are more efficient. The filter units, approximately four feet long and two feet wide and deep, can be stacked to heights of 40 feet or more. They are made by joining alternate sheets of corrugated Koroseal rigid vinyl to flat sheets to form the "pack."

Curtain Walls

Ten years ago there were fewer than a dozen buildings with metal curtain walls in the entire country. As of last year, they accounted for about 15% of exterior walls installed. Forecasts indicate that by 1963, 25% of the outside wall area of all non-residential buildings will be metal clad. These findings are from the Olin Mathieson Chemical Corp., reporting on a survey made by its aluminum marketing research department.

RESEARCH AND DEVELOPMENTS

The number of mathematicians employed in private industry has doubled between 1954 and 1960, according to a recent survey by the Bureau of Labor Statistics.

The survey shows that because of rapid expansion in the field, the average mathematician is considerably younger than his counterparts in other professions. The median age of mathematicians surveyed was 32.5, compared with a median age of about 37 for NSPE members.

Of the respondents providing information on their education, 94 per cent had college degrees, including 7 per cent with PhD's and 26 per cent with master's degrees. Two thirds had majored in mathematics in their highest educational level. Of those who had not majored in mathematics, 70 per cent had studied either engineering or physical science.

The median salary of bachelor's degree holders working in private industry was $7,300, while the medians for master's and doctor's degree holders was $10,000 and $13,000 respectively. The overall median was $8,500.

Basic or applied research and development in the natural sciences and engineering was the major mathematical function of more than half the survey respondents. *(Engineering Employment Practice Newsletter)*

SLIDE RULES

A brochure recently issued by Keuffel & Esser Co. gives the answers to 110 commonly asked questions about drafting processes and materials as well as surveying equipment. The following questions and answers concerning slide rules are indicative of similar treatment given to such classifications as: drawing instruments, drafting film, drafting machines, levels, planimeters and theodolites.

Does the Importance of the slide rule diminish with the increased use of modern calculators and electronic computers?

No—the slide rule increases in usefulness as an inexpensive tool giving quick and accurate solutions to a great variety of problems, any time, any place. It is an indispensable tool even in the development and programming of the electronic computer.

For modern usage, is a special-purpose slide rule preferable to a general-purpose slide rule?

Most mathematicians and scientists prefer the general-purpose slide rule. It is more useful for a greater variety of work.

What is "consistency" in a slide rule?

A full-consistency type scale arrangement is one in which all scales relate consistently to the basic D scale. A consistent scale arrangement is fastest to learn and fastest to use.

Is there a special-purpose slide rule for the surveyor?

Yes, a new rule (#4143) gives horizontal distance and difference in elevation, gives the location of the decimal point and rarely requires more than one setting of the slide.

Who invented the slide rule?

The English mathematician, William Oughtred, was the first to design a slide rule in 1630. Logarithms were invented by John Napier in 1614.

Why are some slide rules made of bamboo and others of mahogany?

Bamboo is very plentiful in the Orient and therefore used for rules made in Japan. Mahogany is the best available hardwood for slide rule use in the western world.

Are any of the modern synthetic materials being used successfully in the manufacture of slide rules?

Yes—various modified polymers, such as vinyls, styrenes and acetals, offer a high degree of dimensional stability and durability for use in slide rules.

Title of the brochure is "What Makes You So Curious?" Copies are available from: Keuffel & Esser Co., Third and Adams Sts., Hoboken, N. J.

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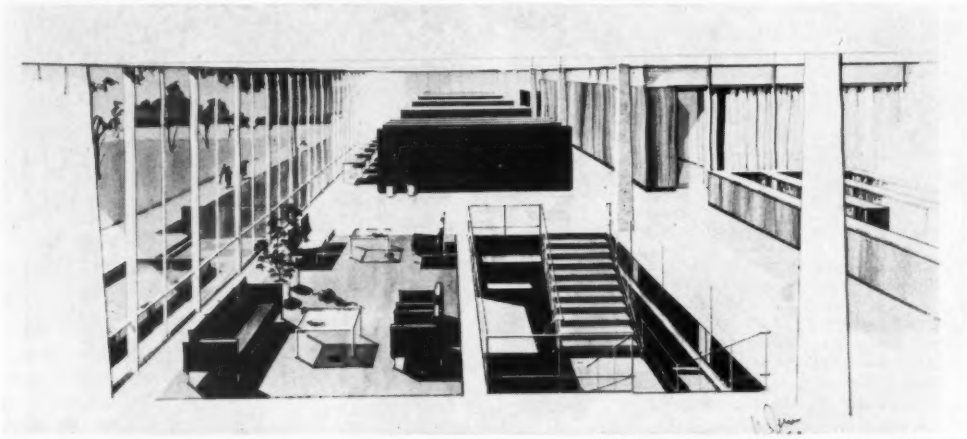
THERMOELECTRIC GENERATOR BUILT OF CERAMICS. Developed by Minneapolis-Honeywell for U. S. Army, *ceramic generator produces four times voltage of intermetallic thermoelectric generators. Output of new device is 1000-1200 microvolts per degree C. Generator is made of 14 layers; nickel oxide is sprayed on side of each layer, platinum on the other.* Pilot model delivered to Army's Picatinny Arsenal is designed to deliver 100 volts under no load. Development of ceramic unit opens way to obtaining electricity from such waste heat as rocket exhaust, which would destroy currently available thermoelectric generators.

John Crerar Library Will Relocate in New Home at Illinois Institute of Technology Campus

Has been at present Randolph-Michigan Ave. site for 41 years. New structure will nearly double former space

by S. W. Lewaren, WSE Library Committee Chairman



Illustration—Courtesy Skidmore, Owings, and Merrill

Illustration shows how first floor of new Crerar Library will be entered by stairway in foreground. Access to building is through door on left side at basement level.

After 41 years at its present site on Randolph St. just west of Michigan boulevard, the John Crerar Library will relocate its facilities on the Illinois Institute of Technology's campus. Groundbreaking ceremonies took place on July 5, 1961 at 33rd St. and Dearborn St., marking the beginning of construction of the new library.

5-Year Study

The decision for this site was the result of 5 years of study by the library management to improve it's services and effect operational economies. Other objectives were, easy access by public transportation, parking facilities, and central location.

The library was founded in 1894 by a gift from John Crerar, a leading industrialist in Chicago from 1862 until his death in 1889. The original Board of Directors consisted of thirteen members who were personal friends of John Crerar, named by him in his will. Among their members were such notable business and professional men as Marshall Field, Robert T. Lincoln, George A. Armour, and Norman Williams, the first president of the library.

By decision of the Board, The John Crerar Library was established as a free public reference library, devoted to science and technology. In 1906, medicine was added to Crerar's scope with the transfer of gift of the Dr. Nicholas Senn collection from Newberry Library, and the purchase of Newberry Library's other medical books by Crerar.

First Location

For the first twenty-five years, the library occupied space in the upper floor of the Marshall Field building on the Wabash Avenue front, moving to the present location in 1920. Where the present library occupies approximately 52,000 sq. ft. of space over 10 floors, the new building will furnish over 92,000 sq. ft. in a two story structure.

More Space for Journals

At present there are approximately 2,000 current journal titles on open shelves in the Technology and Medical Departments. The new library will be able to shelve over 4,000 of its 11,000 current journals in the Research Services Division.

Designed by the architectural firm of *Skidmore, Owings, and Merrill,* the new library building will be two stories in height and 160 ft. by 288 ft. with a total area of 92,160 square feet. The second story and roof will cantilever over the ground floor area, presenting a modern clear glass walled exterior. The entire building will be air conditioned. The ground floor will house the major portion of Crerar library's million books and pamphlets, the mechanical services, special study rooms, and other library departments.

Considering the large number of current monthly issues of technical and scientific publications, the open stacks are planned for portability and expansion.

The second floor will be the primary reader service area of the building, comprising the public catalogs, reference and lending services, acquisitions and cataloging departments, and the administrative offices. It will contain reading areas for students and researchers in

separate divisions. Each division will have 60,000 volumes in an open shelf collection and the research services division for researchers and professional personnel will have a specially arranged section for literature searching. There will also be a limited access collection of journal files for research use. The older, little used books will be in closed stacks and served by messenger.

Reference and reading facilities for researchers and other users will be of latest design for most effective use. Along the exterior perimeter walls of a portion of the building will be individual chair and table arrangements for those who desire privacy.

The student reading area will be open to students of all schools. The general layout will also have thirty-five private study rooms for industrial subscribers. Also, conference rooms for meetings seating up to 85 persons, or small scientific groups.

At the present time, the library has one of the finest historical collections pertaining to science and general technology. Many collections acquired by the library are comparable to those in the Library of Congress and other large research libraries. It has been the policy of the library to acquire, when possible, worthwhile collections that will broaden and add scope to technological development, by delving into its past history. Portions of these collections can now be seen in the ground floor lobby of Michigan and Randolph St. Plans for embodying all these collections as an exhibit for the student body of I.I.T. and other interested parties is under way. Herman H. Henkle is librarian of Crerar and William H. Hyde is librarian of I.I.T.

Power from Molasses

If current research works out, the U.S. someday may use molasses as a source for electricity, reveals International Management, McGraw-Hill publication. Engineers are working on a biochemical fuel cell based on energy given off by decaying materials such as molasses, wood cellulose and sawdust.

* * *

Raindrop-Free Windshields

A rain "repellent" has been devised for airplanes that someday may work on car windshields. The product is designed to keep distortion-causing droplets from forming.

Questions are invited for . . . . . IS IT THE PROPER THING TO DO?

Under the above heading, now familiar to readers, MIDWEST ENGINEER has for over a year published, each month, a question and answer dealing with standards of ethics in the engineering field. Engineers and representatives in allied fields are invited to submit questions concerning engineering practices and procedures involving engineering ethics. Questions submitted will be referred to the Panel. Those selected for publication, together with reply, will be judged on the same basis that has applied to questions that have been dealt with in the column to date.

In submitting questions, letters should be addressed to: The Editor, MIDWEST ENGINEER, 84 East Randolph St., Chicago 1, Ill.

Sewage Station Avoids Corrosion Problem

A new sewage pumping station recently installed for Rittman, Ohio, a community of 5,600, embodies a 36-ton prefabricated concrete structure. Use of concrete eliminates factors of corrosion, flotation and electrolysis points out the producers of this type of station.

The station incorporates two 30-hp variable speed pumps, each with flow rate of 1,850 gpm. Design average flow is computed at 740 gpm. The pumps alternate flow loads and automatically adjust themselves to the flow rate.

The station consists of three chambers, or stories, with each one being 8½ ft. high and 9 ft. in diameter. Units are buried under ground, one on top of the other, with a descent ladder connecting the three. Only an access door is visible above ground. Air circulating throughout the station undergoes a complete change every minute. Pumps, motors, etc., are in bottom chamber. Switch gear and controls are in middle chamber and top chamber serves as storage area.

Installation of single units, or multiple units as in the case of the Rittman system, is quickly and easily accomplished.

The Liftmaster sewage pumping stations are a development of Liftmaster, Inc., 4749 South High St., Columbus, Ohio.

Use of Contract Research Growing Faster Than Industrial Research Investments

Over 7,600 companies sponsoring contract research projects

Use of contract or "outside" research is growing at a faster rate than total industrial research investments, according to National Science Foundation studies. During the latest three-year period available for analysis, total industrial research expenditures increased 44 per cent. In this same period expenditures for contract research increased by 75 per cent (See Logarithmic Chart).

While, of course, most industrial research is conducted internally, the growing use of "outside" research deserves further analysis. Research institutes appreciate that the growing use of their facilities is mainly due to an evolving change in the character of institute-client relationships.

The latest available NSF figure on the subject indicates more than 7,600 companies annually sponsor contract research projects. Significantly more than 70 per cent of companies with 5,000 or more employees use contract research services.

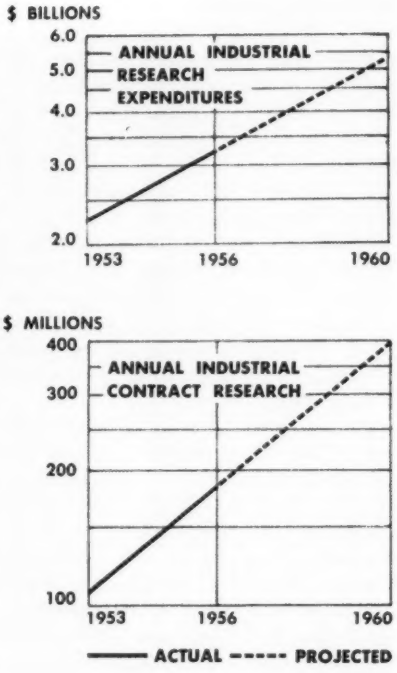
Initially research directors were mainly responsible for the increased use of research institute services. Administrative management is now encouraging such use.

Industrial management is encouraging such use of research institute facilities for the same reasons it employs outside talent to supplement its own staff in legal matters, taxation problems, industrial relations, labor legislation, data processing, production planning, and public relations.

Management employs specialized outside talent in various fields for these basic reasons: 1) To minimize the danger of becoming "inbred" in a particular phase of operations. 2) To tap the up-to-date knowledge of specialists who, because they serve a group of clients, are required to exhaustively study a specific subject. 3) To benefit by association with specialists who cross industry lines. These specialists, through their diverse experience and broad exposure to industry are in an excellent position to draw upon and to apply that experience and background to management's objectives.

The attitude of bracketing the research institute with other outside services is relatively new . . . for the reason that research and development as a major phase of industrial operations is also relatively new.

Research and development investments at the current level require the concentrated interest and concern of all phases of industrial management. This attention of all management to research seems destined to increase. Research expenditures in 1953 represented 1.4 per cent of the gross national product. By 1959 these expenditures had risen to 2.4 per cent of the GNP. It is estimated that in the next decade such expenditures may rise to 5 per cent of the GNP.



Increased use of research institute services is therefore logical. Management is applying the same basic philosophy to research it does to other major phases of operations . . . retaining specialized outside services to inspire and complement internal facilities.

(From "How Contract Research Serves the Needs and Objectives of Industry." Copies of the publication are available from Battelle Memorial Institute, 505 Kings Ave., Columbus 1, Ohio).

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Giant Dragline Bucket

The largest dragline bucket ever constructed in the Bucyrus-Erie Company plant in Milwaukee was recently delivered to a Florida mining company. It can scoop 60 tons of earth at one bite every 45 seconds.

• • •

Antarctic's First Atomic Power Station To Use Portable Units

The Antarctic's first atomic power station soon will be generating 1500 kilowatts of electrical energy for use by U. S. Naval support facilities at McMurdo Sound scientific base. Its energy is derived from a 55-gallon size nuclear core buried deep in the ground.

The PM-3A portable atomic power plant was built for the U. S. Atomic Energy Commission and Navy by the Martin Company's Nuclear Division in Baltimore. The McMurdo Reactor is the second such unit to be built by Martin.

The first has been installed atop a 7000-foot mountain at Sundance, Wyoming, where it will supply heat and power to a U .S. Air Force radar station.

These portable units are designed to service remote areas of the world with heat and power.

The intricate pressure vessels designed to hold the atomic fuel core were built by the Process Equipment Division, A. O. Smith Corporation, Milwaukee, Wisconsin.

These reactor vessels vary significantly from previous ones built by A. O. Smith for commercial power and light production. They are completely portable and can be flown to the site.

The reactor vessels themselves are relatively small—10 feet high and 3½ feet in diameter. Each vessel will be installed in a stainless steel tank buried about 30 feet in the earth. The tanks are then flooded with 20 feet of water which acts as biological shielding for personnel.

Servicing of the reactor can be accomplished with specially designed buoyant tools so that they can be easily manipulated in the 20 feet of water covering the top closure. These tools, designed by A. O. Smith, will be used to remove the canned insulation surrounding the top of the vessel, to loosen and remove the main bolting securing the head of the reactor, and to remove the reactor head itself.

Highway Drainage Data

The Highway Research Board has just released the following publication; Bulletin 286 "Drainage Structures: Design and Performance, 1960." It contains the following reports:

"Laboratory Study of Spur Dikes for Highway Bridge Protection," by Susumu Karaki, Assistant Research Engineer, Civil Engineering Department, Colorado State University, Fort Collins. It describes the effectiveness of spur dikes for reducing scour of banks and stream channels and establishes criteria for determining the length of dike required at a particular location.

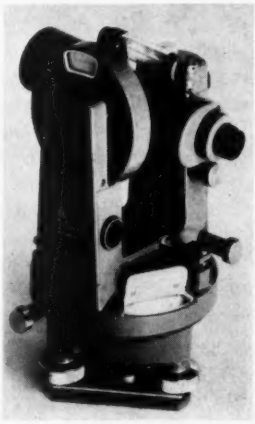
"Culvert Inlet Failures—A Case History," by Roy C. Edgerton, Research Engineer, Oregon State Highway Department. It describes failures consisting of bent-up ends on three large structural plate culverts installed with the upstream ends square and projecting to the fill toe.

"New Developments for Erosion Control at Culvert Outlets," by George L. Smith and Dasel E. Hallmark, respectively, Hydraulic Research Engineer, Colorado State University, Fort Collins; and Highway Research Engineer, Division of Hydraulic Research, U. S. Bureau of Public Roads, Washington, D. C.

Bulletin No. 286 is available from the Highway Research Board, 2101 Constitution Avenue, N. W., Washington, D. C. Price $1.00.

New Transit

Eugene Dietzgen Co., 2425 North Sheffield Ave., Chicago 14, Ill., announces development of the compact, high-precision, fully enclosed No. 6140 Top-Site Engineers' Transit.



This new, dustproof surveying instrument incorporates an anti-reflective, prismatic erecting system utilizing a 7 inch telescope.

According to the company, the Top-Site's magnification (25X) and field of vision equals larger transits and at the same time gives a sharper image.

Other features of the No. 6140 Top-Site Engineers' Transit include a built-in optical plummet that rotates with the instrument for accurate positioning, rough aiming sights, a sliding sunshade attached to the telescope reading for instant use, tubular compass built into the left standard, and a mirror arrangement for quick viewing of the telescope vial. The instrument weighs less than 10 lbs.

The Industrial Engineering Pr

by James H. Greene

ABOUT THE AUTHOR

James H. Greene—Professor of Industrial Engineering at Purdue University since 1948 draws upon a broad academic and industrial background to discuss the subject of the article presented here.

He is a graduate of the University of Iowa, receiving B.S. and M.S. degrees in Mechanical Engineering in 1947 and 1948, and his PhD. in 1957.

During the current year he served with the European Productivity Agency, Paris, France, acting as consultant at seminars held in England, Ireland, France, Denmark and Germany. He was a Fullbright Lecturer during 1960-1961, at the Finland Institute of Technology at Helsinki.

As a consultant he has worked intimately in a number of industrial fields.

He served in the U.S. Field Artillery in the U.S. and in Europe, during 1942-1946.

Industrial Engineering because of its youth is one of the least defined of all the members of the engineering professional family. Just how does it differ from the other sister engineering fields or how can it be distinguished from the modern business schools or their modern counterpart, the industrial management school?

Before embarking upon a discussion of the content of industrial engineering, it is well to place it upon a continuum of professionalism which is understood by all. This is most readily understood by a simple chart which shows, "knowledge requirements" plotted against a "Scale of Professionalism." Fig. 1.

At End of Scale

At the lower end of the scale is the unskilled worker whose level of knowledge concerning his job is relatively low and who is using this to the full extent in the task and associated areas in his daily activity. There is little reserve of knowledge needed or available.

On the other end of the continuum is the highly professional individual who has knowledge far in excess of what is required each day but has it available on call.

Known By What They Do

Looking at this from the viewpoint of decisions, the person on the low end of the scale makes few decisions of minor importance while at the upper end of the scale the decisions are important and require a high degree of knowledge.

The important part of this picture is that the individuals occupying the low end of the continuum are known to society by what they do. One day they may be one thing and the next day another. They are not known by what they are in terms of knowledge. While on the other end of the continuum, individuals are known by what they are in terms of knowledge and not by the task they fill. If doctors or lawyers, on the upper end of the continuum, occupy positions in an industrial organization, which they occasionally do, they retain their professional status and do not become less than what represents their knowledge. They remain doctors and lawyers regardless of where they are. The same must be true of the engineer and in particular, the industrial engineer.

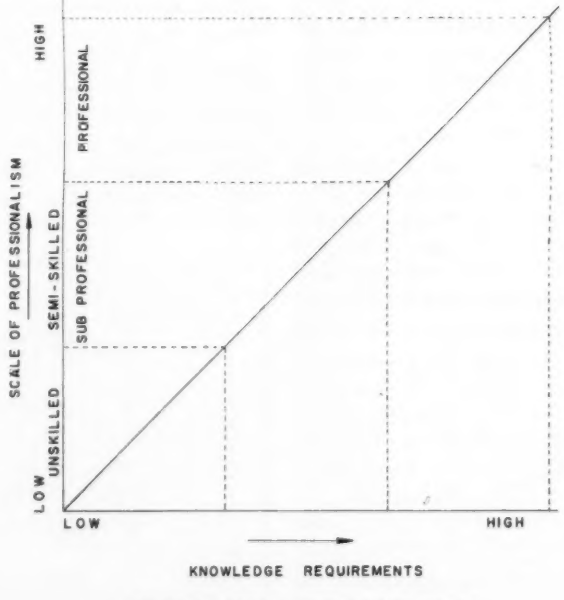
There is no doubt that the trained industrial engineer ranks high on the scale of professionalism because of the wealth of knowledge he must have, but, let us look at just why his knowledge is unique as compared with other engineers.

The industrial engineer is by definition responsible for the coordination of the manufacturing facilities for the production of economic goods. This is a responsibility of which he should be justly proud for what other field can contribute so much to the wealth and well-being of the world?

If the industrial engineer is to coordinate the material, machines, money and people of a manufacturing enterprise, he must have a knowledge of engineering, economics and psychology. This "sphere" of knowledge can be shown graphically, Fig. 2.

These segments should be about equal but with perhaps greater emphasis on the segment of engineering. Looking at this diagram a little closer we can see where all of the sub-segments of knowledge should fit.

The heart of the engineering segment should of course be the basic principles of engineering as applied to industry.



PROFESSIONAL - KNOWLEDGE CHART

FIG. 1

ingProfession Defined

This would include electrical engineering for machine control, civil engineering for factory structures, mechanical engineering for tool design, and others. On the fringe between engineering and economics would be knowledge for engineering economic decisions and would contain cost accounting, machine replacement, theory, engineering economy, plus the newer areas of linear programming, quality control, queuing theory, and similar subjects.

On the other end of the spectrum, between engineering and psychology, would be those areas relating to human engineering, such as traditional courses of motion and time study, personnel relations and industrial psychology. To this can be added many facets of physiology and sociology which are related to human engineering.

The psychology segment should contain the principles of psychology with an emphasis upon the areas of employee training, personnel testing and similar areas. On the border between psychology and economics would be such subjects as marketing, job evaluation and merit-rating. Principles of economics would form the core of the economics area and while some macro economics would be included, the emphasis should be upon microeconomics.

By this industrial engineering sphere of knowledge one can obtain a better picture of the industrial engineer professional. He differs from his fellow engineer in that his knowledge of engineering is broader and more concentrated in the engineering of manufacturing. But of great importance is the fact that he has a strong knowledge of economics and psychology and the associated fringe areas.

From this it is apparent that the industrial engineer must be described by knowledge and cannot be described in terms of an organization chart any more than an electrical engineer or mechanical engineer. Department designations of industrial engineering should be removed from organization charts and replaced with Work Standards Department, Plant Layout Department, and others which are appropriate for the specific task. Mechanical and electrical engineers work in design departments, testing departments and other departments, but, seldom in a Mechanical Engineering Department of Electrical Engineering Department. The title of Industrial Engineer must travel with the man as a reflection of his knowledge and not as a cloak to be worn for a relatively short time.

Frequently the Industrial Engineering Graduate is confused with a graduate of an Industrial Management School, the modern counterpart of the business school. Nothing could be more foolish, for the industrial management graduate not only lacks the all-important segment of engineering with all its tools for analytical decisions, but, also, is lacking in the human-engineering-psychology segment. So, while the names may be confusing, none should confuse the potential of the two graduates.

Referring back to the chart of professionalism, it is evident that the industrial engineer has a deep resource of knowledge available, but, not necessarily used each day. By this reasoning, the industrial engineer ranks far to the right amongst those of the highest professional standing in our society today.

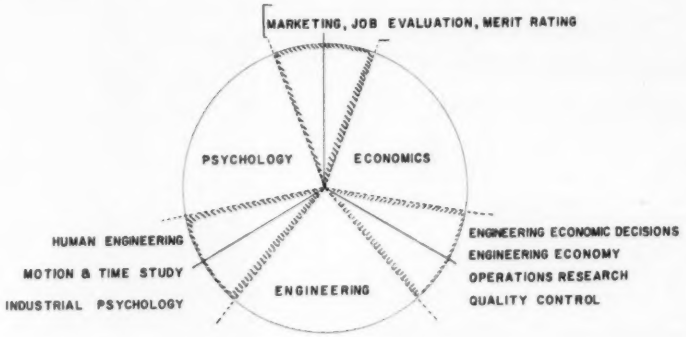


FIG. 2

International Focus on Engineering Testing

by Theodore W. Van Zelst

What has been the growth in engineering testing of soils and construction materials? The best starting place for a review is about 1946. At that time there were approximately 500 laboratories in the world involved in engineering testing of materials such as soils, concrete and asphalt. This number has grown to where there are over 5000 laboratories in the world doing this type of testing.

This growth and interest in engineering testing has been developed through the influence of many unusual factors.

The Dictator Nations

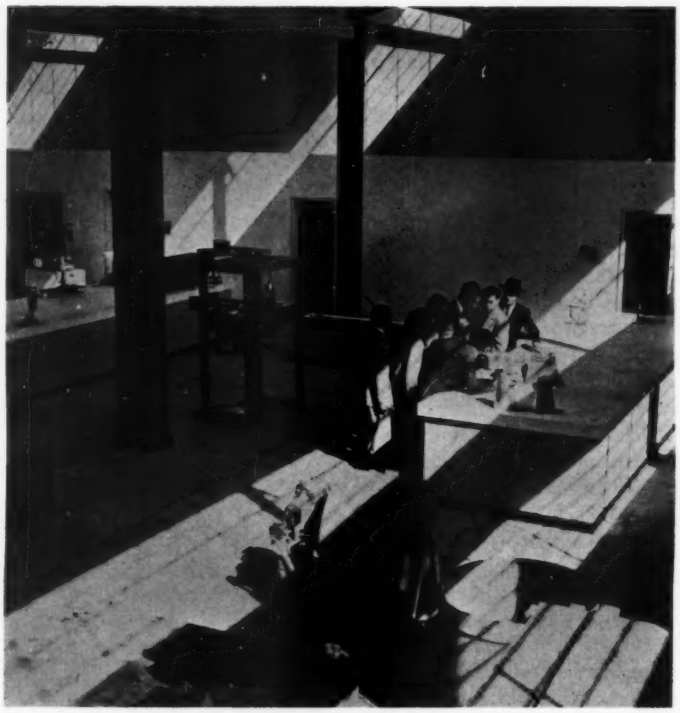
Dictators have come and gone during the past decade. Their sometimes violent exit from the political scene has not been an unhappy occasion. Few people realize, however, that the dictators in recent history have done a great deal to advance the field of engineering testing. Most of these countries have had—or, indeed, still have—fast moving programs of public works . . . works that are used to impress the people and which are left as monuments to themselves.

During the dictator era in one country, millions of dollars of new contracts were let each week, each one with a very definite deadline by date and hour. These deadlines were established in order to meet the schedule of opening celebrations at which the dictator presided. To miss a deadline usually meant financial ruin because of the heavy fines for the contractor.

Because of the tight scheduling it was important that the contractors and engineers have a very thorough knowledge of the materials used on the project and that they exercise very firm control. This developed a nationwide interest among engineers and contractors for subsurface exploration, soil tests and for quality control of other construction materials such as concrete and asphalt. Although the dictator era in this particular country has ended, the interest still persists because both contractors and engineers have found that quality control through testing and inspection actually does result in significant construction savings.

In another country under one-man rule there has been an internal interest in engineering testing principally through activity of the large government laboratories. The government has decreed that more engineers are to be trained for soils and concrete analysis. Training programs are now in existence for soils and highway engineers using mobile laboratories which constantly tour the entire country setting up training courses in each highway district. In these courses, engineers and technicians are trained in all of the basic soil tests with theory and practical application backing up this testing experience. The government wants to receive top value for the money spent on construction.

In the Soviet Union there has been an interest in quality control by engineers. But, based on the observations of engineers who have visited there, much remains to be done in acquainting the government officials with the need for this type of engineering program . . . the roads and many public projects do not show the results of much quality control.



Here is one of the large engineering laboratories in a South American country. The laboratory is used for research and up-to-date practical tests of soils, concrete and asphalt. This is a central laboratory which supports the activities of 10 smaller district laboratories located in various parts of the country.

The Democracies

Let us look at another side of the political picture . . . the countries which are operated on a democratic basis.

In Northern Europe there is an example of a country which became quality control conscious through legislative action. After experiencing severe breakups of roads every spring, several engineers made a study of what could be done to build better roads. They received permission to present their findings to the legislature and proposed legislation for the establishment of a complete government laboratory for soils and other materials testing plus field laboratories.

Based on their excellent analysis of the needs of the country, laws were passed allocating funds; and several years later the new laboratory and governmental activity in engineering testing and quality control was very much

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Theodore W. Van Zelst is founder and president of Soiltest, Inc., Chicago. He is also vice president and a director of Cenco Instruments Corp. Soiltest is a subsidiary of Cenco. Mr. Van Zelst is an associate member of WSE.

in existence. The existence of this laboratory has interested many municipalities in this country in specifying and requiring a complete analysis of soils and materials used in all projects.

Other European countries have similar research laboratories both for soils and concrete and do much to acquaint municipal engineers, governmental engineers and contractors with the need for preliminary investigations and control during the construction.

The Developing Countries

The new nations in Africa and some nations in other parts of the world are actually developing their economies. In places such as Ghana, Liberia, Tankanyika, Rhodesia and Nigeria road programs have just begun to develop extensively in recent years. In most of these countries money is not too plentiful and engineering and annual construction budgets are quite limited. It is in the best interests of everyone that few mistakes be made in design and construction. In going into previously untouched areas where the soils and construction materials are unknown, it is essential that these soils and materials be completely analyzed. In some of the most remote places in Africa one is amazed to find several of the most modern laboratories in the world.

Many of the developing countries are first initiated into the field of engineering testing by large American engineering and contracting firms. The engineers write the preliminary site surveys into the job specifications and then later follow with designs based on these analyses . . . and then specify the type of laboratory which must be set up and run on the project. Frequently this is the initial entry of testing into a country. But the developing countries learn their lessons well, and laboratories and engineering testing usually become an important function on the local scene.

With international interest in testing, a whole new industry has been born. Now there are many producers of instruments used in field and laboratory quality control of soils and materials. In fact, standard test items can now be obtained in almost every country of the world from local manufacturers.

Other Side of the Coin

Up to now we have discussed only the progressive trends in testing. But there is another side of the story. In too many cases specifications call for the establishment of a jobsite laboratory that is never used and the apparatus stands idle.

In other cases, the performance of soils engineering design and testing analysis is handled entirely as a government function. Private enterprise is frowned upon and even the municipalities are forced to have all of their testing work done by one government laboratory. Rather than foster an interest in engineering testing, this technique builds a considerable amount of ill will and the engineering profession suffers as a result.

With the high cost of construction today, everyone in government and industry is interested in saving money. The best way is with techniques which can be used to improve construction, reduce and stabilize construction costs and prevent failures. Soil mechanics and its related field of soil testing has done much to accomplish these end results internationally.

There is a great need around the world for engineers who are trained in soil mechanics and materials testing. It is one of the engineering fields that welcomes young men and offers a tremendous challenge for rapid advancement and an interesting and varied activity. With comparatively little presently known of the soils that lie beneath the earth's surface, much remains to be done by soils engineers of the present and of the future.

Hot Metal Silver Surface Now Applied to Aluminum

The first method ever developed of applying a hot-melt silver surface to aluminum has recently been announced. It offers these advantages: Cost of equipment to apply it, is approximately 1/25th the cost of standard electro-plating tank equipment. Silver can be applied selectively in precisely those electrical contact areas where it is needed, resulting in significant savings of silver. Since the silver is applied in a molten state, it forms an anodic bond with the aluminum, eliminating an oxide layer between the silver and aluminum. The equipment is easily portable, so that it can be placed in any part of a plant, and when necessary, used in the field.

Laboratory and production tested, the fine silver coating has shown superior qualities and cost advantages in the manufacture of aluminum bus bars and switch gear components in the electrical industry. In addition, it has many applications for cable coating and many other uses where aluminum must be protected against oxidation.

The torch to apply the fine silver powder weighs only 40 ounces, allows one handed operation, has no moving parts, and is available either with a standard nozzle assembly or a production nozzle for automatic operation.

The powder, via a carrier gas, moves through a hose from the powder container to the torch, where it is projected onto the target in a molten state. A controlled atmosphere of shield gas, composed of easily obtainable nitrogen and hydrogen, surrounds or envelopes the molten powder to protect it against all forms of contamination from the atmosphere.

A unique advantage of the system is that there is no danger of clogging because of powder left in the hose. Gas pressure in the container automatically clears the hose of powder after the torch is shut off.

Operation of the system is so simple that an untrained operator can learn to handle it efficiently after brief instruction. Presettings of powder, air, and gas gauges make possible consistently reproducible standardized coatings.

For further information, contact: Powder Weld, Inc., 419 Kent Avenue, Brooklyn 11, New York.

The Powder Weld Process, utilizing special torch and Powmet powder, is a development of Powder Weld, Inc., 419 Kent Ave., Brooklyn, N. Y.

This article is published to implement the intent of the Jackling Bequest to The Western Society of Engineers.

Refractory Metal Structural D

This article is presented through the courtesy of Fansteel Metallurgical Corporation. It appeared originally in the October 1961 issue of Fansteel Metallurgy.

The Refractory Metal Structural Development Program has proven that the columbium alloys commercially available at the present time can be fabricated into load carrying components typical of current re-entry designs.

The Refractory Metal Structural Development Program recently completed by McDonnell Aircraft Corporation was sponsored by the Flight Dynamics Laboratory of Aeronautical Systems Division. The program commenced in June 1959 and was completed in mid 1961.

The program objectives were the design, fabrication, and testing of a load carrying structure representative of a typical component for use on a re-entry vehicle, and capable of efficient operation in the temperature range of 1800°F to 2500°F without the use of auxiliary insulation or cooling devices.

Initially, literature surveys defined the refractory metals, their strength allowables, and the availability of oxidation protection coatings. Upon completion of these surveys, the preliminary test component design criteria were established. During the early phases of the program, small refractory metal assemblies were designed, fabricated and tested to (1) evaluate potential subcontractors, (2) explore fabrication techniques, (3) investigate materials and coatings, (4) evaluate type of construction, and (5) evolve test techniques.

Four small assemblies were fabricated from Fansteel 82 metal[1] and four from molybdenum (0.5 zirconium). One molybdenum assembly was coated with Chromalloy W-2 molybdenum disilicide and the remaining molybdenum and columbium assemblies were chrome plated to afford oxidation protection at the 2500°F test temperature.

The data obtained from these small refractory metal test assemblies aided in establishment of the final component design and disclosed many problem areas which were subsequently avoided in the fabrication and testing of the final component. A full-scale fin-rudder typical of that for a DYNA-SOAR type vehicle was selected as the final component.

It was fabricated from two columbium allows: General Electric F-48 Alloy[2] and Fansteel 82 Metal. All of the fittings which required fusion welding were made from Fansteel 82 Metal. A General Electric LB-2 (aluminum-chromium-silicon) spray-dip coating was used for oxidation protection of the component parts with the exception of fasteners. The fasteners used for final assembly were coated with Thompson-Ramo-Wooldridge (TRW) vapor deposited coating.

Testing

The heating systems designed and fabricated by McDonnell for the Refractory Metals Program have attained specimen temperatures of 2500°F. The heating system for the final component consisted of two banks of quartz radiant heat lamps with twenty-three temperature control areas.

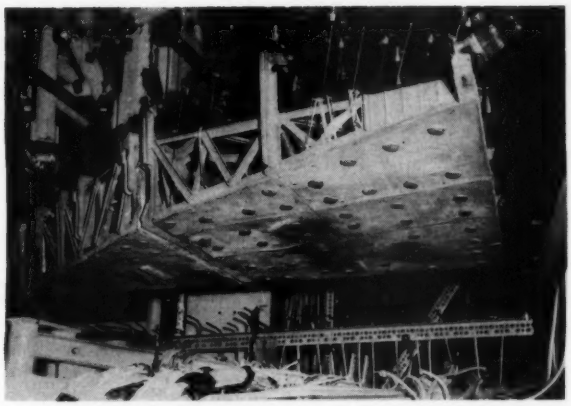
A loading system using refractory metal loading rods of F-48 and Fansteel 82 Metal loading washers was devised for final component testing. The anticipated pressure load distribution was simulated by use of the loading rods with panel thermal response apparently being unaffected. The loading rods were connected by whiffletree assemblies to which programmed loads were applied by a hydraulic jack. Leading edge loads were applied at points constructed as an integral part of the specimen with load directions being along the theoretical leading edge load paths. In areas where relatively low temperatures were prevalent, Haynes Alloy L-605 had proven satisfactory for loading and load reaction assemblies.

For temperature control and determination of temperatures to 3000°F, platinum vs. platinum-10% rhodium thermocouples were used. The thermocouple wires were spotwelded to the specimen and routed through small diameter alumina tubes with exposed

[1]Cb - 33% Ta - .7% Zr.
[2]Cb - 15% W - 5% Mo - 1% Zr.

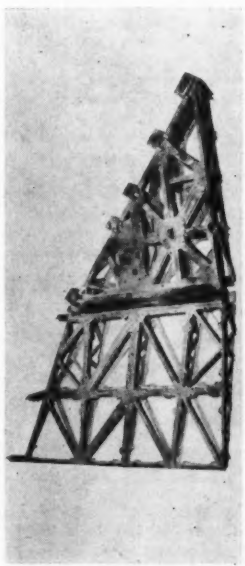
ra Development Program

at McDonnell Aircraft Corp.



Final fin-rudder component with corrugated panels after testing. Discolored areas on panels were where quartz heat lamps broke after testing.

joints covered by a high temperature cement. Experience gained from this program brought about the development of thermocouple installation techniques which are essential for the instrumentation of coated specimens because thermocouple output from conventionally installed thermocouples becomes erratic due to changes in properties of the coating materials at temperatures in excess of 2000°F. Every thermocouple junction was protected by a high temperature cement to assure oxidation protection of the columbium in areas that could possibly have been damaged during thermocouple installation.



Coated fin-rudder sub-structure assembly

Determination of specimen deflections was accomplished through the use of alumina or zirconia compression rods linked to potentiometers. Experience has shown that overall structural deflections must be determined directly from the substructure as panel warpage can affect deflection readings. For the final component tests, structural deflections were determined from skin panel attachment bolts with panel warpage being determined separately.

Etched foil strain gages with temperature compensation were used to determine load distributions within the test specimen. Loads were applied and strains determined with the test specimen at a temperature higher than the brittle-ductile transition temperature to avoid any brittle failure. The following table summarizes the final component test conditions.

The fin-rudder component was tested under load at or about 1900°F for over ½ hour and at 2350°F for 15 minutes. Examination of the component showed only one small area where the coating failed but the columbium alloy beneath it was unharmed.

The Refractory Metal Structural Development Program has proven that the columbium alloys commercially available at the present time can be fabricated into load carrying components typical of current re-entry vehicle designs. It has also shown that these alloys, properly coated, can withstand the temperatures to which such a vehicle would be subjected.

TEST SEQUENCE FOR LOAD-TEMPERATURE EVALUATION

	RESUMÉ TEST CONDITIONS	
TEST CONDITIONS IN ORDER OF APPLICATION	SURFACE TEMPERATURE (°F)	LOAD LEVELS (%DLL)
1	400*	67
		100
		150
	1000	
2	1900	0
	2350	0
	1000	67
3	1900	100
	2350	150

*Test temperature will exceed the brittle-to-ductile transition temperature.

This article is presented to implement the intent of the Jackling Bequest to The Western Society of Engineers.

ENGINEER OF THE YEAR AWARD
PROFESSIONALISM AWARD

Presented annually at Chicago Engineer's Week Banquet
Wednesday, February 21

CRITERIA FOR AWARD
Engineer of Year

1. Outstanding engineering achievement.
2. Practice of good moral and ethical standards.
3. Active participation and support of engineering society work.
4. Good citizenship and interest in community affairs.
5. Leadership in encouraging other engineers to be active in engineering societies and developing their ultimate technical potential.
6. Significant research work, preparation of technical papers, and favorable acceptance of same by the engineering profession.
7. Must live or work in the Chicago Metropolitan area.

CRITERIA FOR AWARD
Professionalism

Award made to the Chicago area consulting firm, municipal or governmental agency, industry, or educational institution that has done the most toward the encouragement of professionalism among its engineering employees.

Award is presented in recognition of an outstanding record in the development and use of engineering development practices in accord with professional standards.

Factors considered for the award:

1. Are engineers encouraged to become registered?
2. Does the organization provide some financial assistance for refresher courses for the registration examination?
3. Does the organization encourage the display of the registration certificate in the office of, or near the individual's work area?
4. Are registered engineers permitted and required to sign and seal all plans, reports, specifications, etc., which they have prepared?
5. Are engineers encouraged to become members of their professional society, and to participate in its meetings?
6. Does the organization encourage and provide time for engineers to participate in activities of the professional society?
7. Are the engineers' professional attitudes and activities weighed in considering promotions, and, if so, is this fact made known to all the engineering staff?
8. Are the engineers' supervisors likewise professionally conscious and encouraged to pass this spirit on to their subordinates?
9. Is the administrative development of the engineer encouraged and utilized?
10. Is advanced technical training encouraged and does the organization pay for any portion of the tuition for university work?

Nominations Must Be Mailed By January 1, 1962

For information and forms for making nominations to the awards contact:
Chairman, Award Committee, Chicago Chapter, Illinois Society of Professional Engineers, 8 S. Dearborn Street, Chicago 3, Illinois.

Granite Surface Plates

A four page technical bulletin entitled, "Granite Surface Plates—Bulletin 101," provides information on Granite characteristics to be considered when selecting surface plates. It contains a chart on the "Relative Merits of Important Characteristics," such as Granite color, abrasive resistance, flexural strength, economy and size. A complete price list on Ottavino Gray, Pink and Black Granite Surface Plates, giving sizes in inches, thickness, ledges, overall accuracy and shipping weight is also included. Bulletin available from A. Ottavino Company, 1026 Brooklyn Avenue, Brooklyn 3, New York.

Solar Stove Works Up to 6,000° of Heat

A large dish-shaped solar concentrator developed by Goodyear Aircraft Corporation's Arizona division can work up to 6,000 degrees of heat at its focal point. The instrument is used to test materials for outer-space vehicles. Its maximum heat output is enough to turn most metals to boiling liquids.

Gas Turbine Power

Gas Turbine News, a new publication put out by The Cooper-Bessemer Corp. of Mount Vernon, Ohio, covers the latest developments in the gas turbine power field which has exciting promise for a broad range of industrial drives and for power generation of the future.

Cooper-Bessemer is the designer and builder of the first commercial gas turbine installation in which a modified Pratt & Whitney J-57 jet engine was wedded with a Cooper-Bessemer specially designed free power turbine. The resulting engine is labeled the RT-248 by Cooper-Bessemer and is ideal for gas transmission, electrical generation and so on. The first installation at Clementsville, Ky. generated such interest that progress in the field is being followed by Cooper-Bessemer in the new publication. Copies are available from: The Cooper-Bessemer Corp., Mount Vernon, Ohio.

Use of Old Caissons Saves $300,000

Some $300,000 will be saved for Home Federal Savings and Loan association in connection with construction of its new 16-story building at Adams and State through use of caissons that supported the Republic Building formerly on the site since 1905. The Republic building is said to have been among the first in Chicago to use concrete caisson technique in foundation work.

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Reviews of Technical Books

Consulting Engineering

The Consulting Engineer, by C. Maxwell Stanley, senior partner of the Stanley Engineering Co., Chicago. Published by John Wiley & Sons, Inc., 440 Park Ave., New York 16, N. Y. 258 Pages. Price $5.95.

Because the successful practice of consulting engineering requires able management, as well as technical proficiency, this book was written with the purpose of apprising engineers considering or already engaged in the business of consulting engineering with the problems of management.

The author, drawing upon his many years of experience of operating his own successful consulting practice, introduces the engineer to the factors which influence the success of such a venture. No problems of management are solved, but rather the advantages and disadvantages of alternate solutions are presented for consideration, such as: development of a clientele, engineering service contracts, ownership forms of the organization, operating forms of the organization, personnel management, methods and techniques, supporting services and accounting and financing.

When available, data such as fees for engineering services, and costs and profits are clearly presented.

The three appendices contain typical engineering service contracts, description of grades for classification of personnel, and suggested classification of accounts. L.M.G.

Handbook of Numerical Methods for Solution of Equations

Handbook of Numerical Methods for Solution of Equations by V. L. Zaguskin. Published by The Pergamon Press, Inc., 122 East 55th Street, New York 22, N. Y. 195 pages. Price $6.50.

Numerous methods which may be used to achieve any of several objectives with algebraic and transcendental equations are presented.

Included in the book are "Initial Information About Polynomials And Transcendental Functions," "Operations With Approximate Numbers," "Methods For Approximate Determination Of Roots," "Methods of Making More Accurate Roots Already Found," "Solution of Equations of Low Orders and Extraction of Roots," "Solution of Simultaneous Equations," and "A Table for the Solution of Cubic Equations."

Under these objectives numerous methods of procedure are described, developed, and illustrated. Once tried, many of the methods will permit the user to solve quickly problems which would be tedious under conventional solutions.

For those desiring more rigorous treatment of some one of the methods discussed, 72 references are listed. D.R.H.

Tool Steel Simplified

Tool Steel Simplified—By Frank R. Palmer and George V. Luerssen. Published by The Carpenter Steel Company, Reading, Pa.—Price $2.50. Pages 595.

This book is an invaluable aid to the men in industry, who are responsible for the design, making, or heat treating of tools.

The authors recognize the fact that most tool makers are seldom taught how to select the right tool steel for each kind of job and how to correctly heat treat it and place particular emphasis on these subjects.

The book is divided into four parts:

Part I covers two things the reader should acquire by way of background. A speaking familiarity with the words and terms of tool steel and a knowledge of what tool steel is.

Part II describes a simplified method for selecting the right tool steel for making all sorts of tools.

Part III deals with simplified methods for heat treatment, including comprehensive discussions of high speed steel, the hot work steels, and the air hardening steels.

Part IV presents a group of "things worth knowing." Although the first three parts of the book tell "how to do it," the reader will find he can do it more easily and more accurately after he has read the chapters in part IV. H.J.G.

Instant transmission of medical data by telephone — directly from the human body to remote recording instruments anywhere in the country — will soon be possible through use of special DATA-PHONE data sets now being developed.

The system of transmitting "live" electrocardiographs is now under development by the Bell Laboratories and will be available to doctors and hospitals some time next year.

Tests on transmission of X-rays by telephone are also being conducted in the current investigation of the most efficient and economical means for sending other types of electronic medical data over telephone facilities.

Termed a major advance in medical communications, this system means that consulting specialists anywhere in the United States can receive instant data on heart performance by telephone, even during an actual operation.

In practice, a medical attendant telephones the number of the one or more locations to receive the electrocardiograph after attaching electrodes to the patient. Then, by pushing the data button on a compact DATA-PHONE data set, heart pulsations are transmitted over the telephone to a recorder at the receiving location.

A new file sharpening chemical, introduced on the Pacific Coast last year, is coming into use generally in this country and abroad. This non-toxic chemical is known as Kem-Kut. An independent testing laboratory, Kniseley Engineering of Seattle, summarized its tests as follows: 1) Non-toxic and can be used under normal ventilation and safety conditions. 2) Under recommended use conditions, file rinse solutions can be washed into sewer systems without harm to systems. 3) Sharpening action takes place at room temperature, requiring no extra heating.

The solution is described as uniformly etching only 1 to 1½ mils from the file surface, thus allowing the file teeth to retain designed pitch and rake angles without loss of clearance depth.—Chem-Tech Corp., Bellevue, Wash.

Obituaries

MURRAY BLANCHARD, retired consulting engineer, 87, and a member of the Western Society of Engineers since 1914, died October 3, in Cleveland, Ohio. He was a graduate of the University of Michigan, with a degree in Civil Engineering. Upon graduation he was engaged in engineering for many years in New York City. Coming to Chicago in 1913 he served as Assistant Engineer, Sanitary District of Chicago. After service in World War I he was hydraulic engineer for the State of Illinois. Following that he was construction engineer for the City of Chicago. For a number of years he was engineer with U. S. Engineering Department.

Mr. Blanchard attained life membership in WSE in 1945. He was a past president of the Chicago Sections of ASCE and SAME.

LEWIS McDONALD, retired Chicago Bridge & Iron Co. vice president, died on October 20th in Chicago. He was 77 years old.

Mr. McDonald's career with CB&I spanned more than 44 years prior to his retirement in 1954. He was manager of the company's Chicago sales district from 1921 to 1931 and served as assistant to the vice president prior to his election as a vice president in 1946.

Mr. McDonald was graduated from McKendree College (Lebanon, Illinois) in 1905, and from the University of Illinois in 1908 with a B.S. degree in Civil Engineering. He remained at the University of Illinois as an instructor in Civil Engineering department for the next two years.

He was a life member of the University of Illinois Alumni Association and was a member of the association's board of directors in 1950 and 1951. He was president of the Chicago Illini Club in 1949. Mr. McDonald also was a member and past president (1939) of the Chicago Engineers Club.

JOHN D. BARBER, a member of the Western Society of Engineers since 1917, died in Mesa, Arizona on October 16. His many years of professional activity prior to retirement were spent with the Illinois Central and other railroads and later with the City of Chicago.

Mr. Barber attained life membership with WSE in 1949. He was born in Waukegan, Ill. in 1874 and received his technical education at Armour Institute.

Committee Outlines Compact Story For Use in "Every Member Get a Member" Effort

For several years the membership committee has used the slogan "Every Member Get a Member." In doing so it has assumed that every member of WSE can explain in a brief and concise manner the history, objectives, activities and benefits offered.

However, just to expedite acquainting prospective members with "What It Means to Belong to WSE," the committee suggests that the following brief statement will be helpful in telling them about our Society.

"The Western Society of Engineers was formed more than 90 years ago to bring together engineers from all branches of the profession.

The objectives are to: 1) Advance the theory and practice of the profession. For this purpose we are organized into nine sections representing various fields of engineering and three divisions: Education and Research, West Suburban and Management. 2) To serve the interests and needs of the engineering profession through the general committees, Young Engineers Forum and the Society publication, MIDWEST ENGINEER. 3) To contribute to the liberal and technical education of members. (The year's program includes general monthly evening meetings, at WSE headquarters and West Suburban monthly meetings held at Lilac Lodge in Hillside, Ill.)

4) To encourage participation in community affairs. 5) To aid interests of the employer through enabling the engineer to keep pace with advancing technology."

Robert R. Taylor Homes

A miracle of modern construction is taking place on the South Side where buildings seem to spring out of the ground overnight along State Street between 39th and 54th.

More than 2,000 skilled craftsmen, each working forty hours a week or more, are transforming the 95-acre site from a dense slum to a home community. This is Robert R. Taylor Homes, where 4,415 families will be living by the end of 1963.

Some indication of the speed of the job can be gained from estimates by the Gust K. Newberg Construction Company, general contractors, that in an average week, concrete frames for seventeen stories are poured, and about half a million bricks are laid.

Each of the development's twenty-eight buildings rests on 69 caissons, based on hardpan, at an average depth of 34 feet. Each building requires the pouring of about 6,600 cubic yards of concrete, reinforced with some 1,400,000 pounds of steel. About 119,000 lineal feet of copper tubing is needed to carry radiant heat to the apartments. About 75,000 concrete blocks and 500,000 bricks are laid for each of the 16-story structures.

■■■■■■■■■■■■■■■■

West Suburban Meeting
Wednesday
January 10, 1962

PLACE: THIS WILL BE THE THIRD SCHEDULED MEETING AT REMICK'S LILAC LODGE, WOLF & CERMAK ROADS, HILLSIDE, ILL.

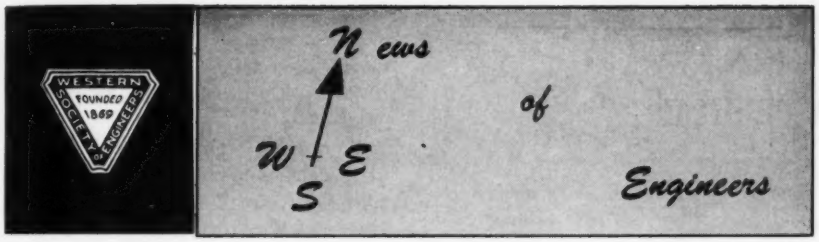
DINNER: 6:30 p.m.—Tickets $3.00. RA 6-1736 FOR RESERVATIONS. LADIES ARE INVITED.

PROGRAM: THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION WILL DISPLAY MODELS OF LAUNCH VEHICLES, SATELLITES AND SPACE PROBES, ELECTRONIC EQUIPMENT AND OTHER SPECIAL DEVICES FOR DEMONSTRATING ASPECTS OF SPACE SCIENCE AND EXPLORATION.

■■■■■■■■■■■■■■■■

CORRECTION

In the article on a radiation detector now being used by the Chicago Board of Health — Page 4, November issue — a typographical error was made in the price. The correct figure is $15,000. Device is made by Radiation Instrument Development Laboratory, Inc., Melrose Park, Ill.



or: Personals of Personable People

A. L. Tholin, Chicago's Engineer of Public Works, retired at the end of October. He joined the department in 1939 as a senior civil engineer. He said he expects to supervise architects and contractors in the construction of churches and church-owned schools in foreign nations for the Presbyterian Church. Tholin several years ago was named an outstanding layman by the Church Federation of Chicago. He is a graduate of the University of Illinois.

Some 200 engineers paid tribute to Mr. Tholin at a retirement luncheon on November 2.

Succeeding Mr. Tholin as Engineer of Public Works is **Milton Pikarsky,** Administrative Engineer in the department. He now assumes the title of Administrative Engineer of Public Works. He has been with the department since April 1960, working as a co-ordinator for the O'Hare Field Terminal project and on other assignments.

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On November 15, a Twenty Year Award was presented to **Leonard F. Lang,** Manager of Power Industry Engineering Sales, Western Precipitation Division, Joy Manufacturing Company, by P. W. Zilliacus, General Sales Manager of Western Precipitation Division. Mr. Lang began his service with Western Precipitation in Chicago on September 1, 1941 and has served in various capacities including that of District Manager, Chicago, until his appointment in January of 1960 when he was named Manager of Power Industry Engineering Sales. Mr. Lang is responsible for sales of Western Precipitation products to the utility industry which is the largest market area for the company. He is a member of American Society of Mechanical Engineers, Western Society of Engineers and Air Pollution Control Association.

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C. A. "Can" Nordquist has been named Planning Engineer—Utility Marketing by I-T-E Circuit Breaker Co.

To the newly-created post, Nordquist brings years of experience in and with many U. S. utilities. His knowledge of product application to their systems is extensive and will be available to the company's field staff, on a nationwide basis, as needed to enhance service to utility customers.

Nordquist has been associated with I-T-E in the Chicago area for 33 years. In 1956, he was named assistant Midwest regional manager.

Although he is attached to the corporate marketing staff in Philadelphia, Nordquist will continue to maintain headquarters in Chicago.

He is an alumnus of Northwestern University, with B.S. and E.E. degrees.

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Norman E. Schmidt, for the past seven years building director for Evanston, has resigned to take the post of superintendent of construction at Northwestern University. He will supervise the construction of the new administration building structures for sports events near Dyche Stadium, the new chapel, and buildings on the lakefront addition to the Evanston campus scheduled to start next year.

He is a graduate of Northwestern where he received a bachelor of science degree in civil engineering.

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Robert P. Saar, Vice President of the Henry Pratt Company, announces the appointment of Robert Blair, Research Chemist. Mr. Blair was formerly with the B. F. Goodrich Company. He will operate in the Company's Dixon, Illinois, laboratory in research work.

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Edison Service News for November carried a brief article on the Young Engineers' Forum regarding activities and current programs. It cited the roles of Commonwealth's Personnel, Director **Volney Leister** and Educational and Training Supervisor, **George Rodman** in the Forum's work. Mr. Leister is chairman and Mr. Rodman, vice chairman.

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The Dominican Republic has retained **Meissner Engineers, Inc.,** to develop exploitation of what is believed to be the largest deposit of high-grade iron ore in the Western Hemisphere.

Iron ore deposits located in Shanchez Ramirez and Duarte provinces, the largest so far defined in the country, are believed to be "extraordinarily large" and may be the richest, in terms of physical and chemical properties, in the world.

Meissner said he expects construction on the $60-million mining and processing facilities to begin before the end of the year and hopes to begin ore shipments 18 months later. Recent surveys show that the Western Hemisphere alone consumes 300-million tons annually, with consumption increasing at a rate of 30-million tons per year.

Robert C. Meissner, a M.I.T. graduate, is president of the firm which has been frequently retained by leading iron and steel companies in this country and overseas on major projects ranging from mining operations to computer-controlled production processes.

•

Miniaturized Working Electronic Computer Is No Larger Than A Loaf of Bread

A completely miniaturized working electronic computer—the size of a loaf of bread yet capable of performing calculations at the speeds of a room size computer—was demonstrated recently by scientists from Burroughs Corporation, Detroit 32, Mich.

The operating model was built to show how a new method of miniaturized computer construction makes it possible to shrink a commercial computer from room size to the size of a desk. The method also demonstrates how vitally needed military electronic equipment may be "compressed" to a size practical for use in aircraft, spacecraft or missiles.

The baby computer is a single-purpose "brain" that could solve many single-purpose commercial or military problems calling for speeds of a computer. This is the first fully miniaturized computer to be shown in actual operation. It was demonstrated as it might be used by the military to solve a target chase-and-catch problem from an airplane, spacecraft or missile.

In building the baby "brain" the scientists used only electronic components which may be readily purchased "off the shelf" in the market today. This assured not only additional ease of manufacture through use of the method of construction but assured a universal supply of spare parts for servicing as well.

In their quest the scientists developed the construction, or "packaging system" termed Macro-Module. The model, built through use of the system, is technically a practical working "digital differential analyzer."

Called *MADDAM* (the name is derived from *MA*cro-Module and *D*igital *D*ifferential *A*nalyzer *M*achine organization), the computer has 5,500 components housed in a space measuring 3 x 6 x 11 inches and a component density of 69,000 components per cubic foot. The computer weighs 12 pounds and can perform 33,000 mathematical calculations per second.

The Madro-Module method has a finned heat exchanger as a central element in a "log" or row of triangular chips. The chips, approximately three-eighths inch thick and the height of a half-dollar contain electronic circuitry and plug into a folding printed circuit board. Additional compactness is obtained by folding (or actually wrapping) the board holding the upright chips around the heat exchanger. The chips fit snugly between the fins of the heat exchanger. Two such rows of chips each three inches square and ten inches long, contain the circuitry, logic, memory and other working parts of the computer.

Applications

Richard A. Hornburg, Equipment Engineer, Western Electric Co., Inc., Merchandise Mart Plaza.

Gregory A. Kurkjian, Jr., Engineer Prod. Design, Henry Pratt Co., 319 W. Van Buren St.

Norman S. Fagerson, Sales Engineer, Morse Twist Drill & Machine Co., New Bedford, Mass.

William R. Steinman, Sales Engineer, Carrier Air Co., Merchandise Mart Plaza.

Anthony Zummer, Partner; Stone, Nierman, Burmeister & Zummer, 134 S. LaSalle St.

Donald W. O'Reilly, Planning Engineer, Western Electric Co., Inc., Hawthorne Station.

Frank Bueche, Supv. Engineer, Illinois Bell Telephone Co., 201 N. Wells St.

Philip E. Hogin, Works Engr. of Manufacture, Western Electric Co., Inc., Hawthorne Station.

R. O. Anderson, Field Engineer; Fairbanks, Morse & Co., 1550 S. State St.

Arthur M. Wagner, Supt. Dev. Engineering, Western Electric Co., Inc., Hawthorne Station.

Douglas T. Kingsley, Dept. Chief-Equip. Engrg., Western Electric Co., Inc., Merchandise Mart Plaza.

Martin F. Brickner, Systems Engineer, International Business Machines, 7321 Lake St., River Forest, Ill.

Robert E. Costigan, Financial Analyst, Duff and Phelps, Inc., 208 S. LaSalle St.

Royce A. Hoyle, Jr., Associate, Duff and Phelps, Inc., 208 S. LaSalle St.

John R. Crowe, Senior Proj. Engr., Electro-Motive Div. of G.M.C., LaGrange, Ill.

Francis W. Durocher, Vice Pres. charge of Constr'n., Gust K. Newberg Construction Co., 2040 N. Ashland Ave.

Engineering and Usage Data on Thermocouples

A new 56-page catalog on the comprehensive line of thermocouples for Industrial Application is available from the Wheelco Industrial Instruments Division of the Barber-Colman Company, Rockford, Illinois. The new catalog not only carries descriptive information on these products, but also includes engineering information concerning thermocouple usage and application. Ask for TC13A.

Engineering Societies Personnel Service, Inc.

Est. 1918

Chicago	New York	San Francisco
29 E. Madison St.	8 W. 40th St.,	57 Post Street,
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POSITIONS AVAILABLE

C-8936 VILLAGE ENGR. Grad. CE age 30-40; 3 + yrs. exper. with municipality or consultant on design & field work, general nature. Municipality of 20,000 good potential sal. $9/10,000, loc. N.W. Chgo. suburb, employer will pay the fee.

C-8957 (B) MECH. ENGR. Degree. Min. 3 yrs. exper. in product design in metal fabrication & structures. Sal. $8400/12,000 loc. Chgo., (C) PRODUCTION ENGR. Degree, exper. in welding methods tooling, job shop operations. Sal. $8400/12,000 loc. Chgo., employer will pay the fee.

C-8889 (A) PLANT MANAGER Min. BSME age to 40; to coordinate facilities, suggest modification of eqpt., realignment of machinery. Maintain good cost balance & control budget. Plant employs abt. 1000, sal. $14/18,000 loc. Calumet area, employer will negotiate the fee.

C-8893 INDUSTRIAL ENGRS. Grad. IE or ME age to 40; 4 + yrs. exper. in methods, work on maint. & repair of heavy eqpt. for a railroad, sal. to $8400, loc. So. Chgo. suburban area, employer will pay the fee.

C-8948 SR. ELECT. DESIGN ENGRS. (A) Grad. Exper. in motor generator sets, magnetic amplifiers. Familiar with military specs. as applied to elect. components & wiring. Able to supv. jr. engrs. assigned to design elect. ground support eqpt. used in checkout of aircraft, missiles & rockets. (B) 5 yrs. design of indicating instruments for design & spec. able to explore new materials & act as liaison between sales, engrg. & customer. (C) Design exper. in transistor circuitry, logic systems, data processing, digital display eqpt., servo-control systems & instrumentation. (D) Recent Grad. EE trainee for indicating instrument design; work involves lab. experiments, writing specs. & engrg. Customer instrument orders, sal. open, loc. Chgo., employer will negotiate the fees.

This page is published to implement the intent of the James H. Brace bequest.

C-8851 ASST. SUPV. BLDG. CONST. Grad. CE, EE or ME age 32-45; 44 yrs. supv. exper. with a bldg. design firm or in const. dept. of large organization, plus 8 yrs. exper. in actual design of mfg. facilities & related utilities. Duties: Asst. in the supv. of bldg. design & layouts for new facilities or in the alteration & repair of existing facilities incl. budget information & cost records. Consult with architects, contractors & company personnel re: remodeling & supv. preparation of sketches & drawings showing most effective space & mat'l. utilization & economy of design. Follow progress & construction of new or remodeling work for multi plant operation in metal field, sal. $84/12,000 loc. Chgo., employer will pay the fee.

ENGINEERS AVAILABLE

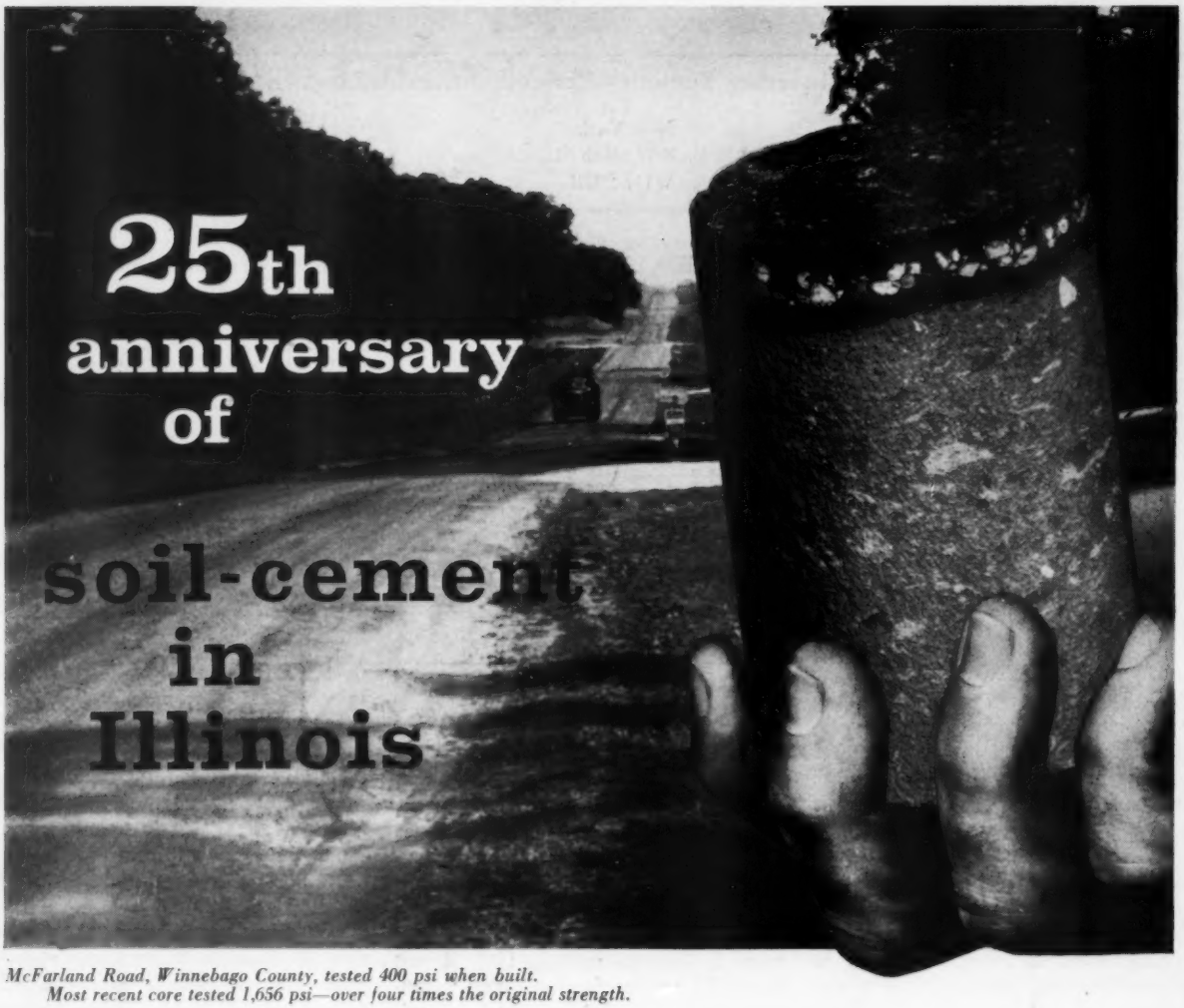
MW: 725 SALES ENGRG. & MGMT. ME + bus. admin. 43; 15 yrs. sales engrg. & mgmt. Pumps & indust. eqpt. Following of top architects, engrs., O.E.M.'s & large users, sal. $10,000 + loc. Chgo., Midwest or West Coast.

MW: 726 MECH. ENGR. BSME 43; 16½ yrs. in capital goods industries as estimator, designer, checker & sales. Well varied exper. in 4 industries; very adaptable to new jobs & get along well with people. Sal. $8400 loc. Chgo. Loop or Calumet area.

MW: 727 SALES ENGR. BSME 39; 10 yrs. in elect. utility field selling distribution transformers, meters, capacitors, street lighting eqpt., cutouts, instrument transformers, regulators, lightning arresters, sal. open, loc. Midwest or West pref.

MW: 728 DESIGN PROJECT MGR. or CHIEF ENGR. BSME 47; 25 yrs. diversified design & supv. exper. in high speed auto. mach'y. & automation eqpt., over half of which is in graphic arts. Demonstrated tech. & managerial capabilities, sal. $14,000, loc. any.

MW: 729 DEVEL. & DESIGN ENGR. BSEE (communications option) 23; exper. in design, redesign & analysis of semiconductor pulse & digital circuits, logic circuits & power supplies, sal. $7600, loc. Chgo. area.



McFarland Road, Winnebago County, tested 400 psi when built.
Most recent core tested 1,656 psi—over four times the original strength.

Built in 1936, this Winnebago County Road has increased in strength more than 300%

...soil-cement pavement grows stronger year by year!

Cores cut from the first soil-cement road in Illinois show that soil-cement gains in strength from the first day it's laid . . . and keeps gaining in strength every year.

Since 1936, when the Illinois Division of Highways pioneered an experimental project in Winnebago County, soil-cement has become a major paving material for secondary roads, city streets, airports and parking areas.

By the end of 1961, just a quarter century later, more than 7,000,000 square yards have been built in Illinois—and the total is now increasing at a rate of approximately 1,000,000 square yards per year. Virtually *all* of this pavement is still in use—with almost no maintenance costs for the soil-cement base!

Inch for inch, soil-cement is the strongest pavement short of concrete. It provides beam strength that spreads the load over the subgrade. No softening, no break-up after a hard winter. That's why maintenance costs stay low.

Today's engineers in Illinois and other progressive states are making soil-cement America's fastest-growing low-cost pavement.

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